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the Hawaiians, alone make poi, other people using the bulb like yams or potatoes. It is said that the corm of the common Jack-in-the-pulpit of New England woods may be treated as kalo, even to the eating.

Pandanus verus, Vaquois, Screw-pine, Lauhala. The pandanus, with its aerial roots and terminal tufts of long graceful leaves, is known by many pictures, but few have eaten the fruit. This much resembles a pine in shape and size, and is hard and useless until fully ripe, when the pulp surrounding the nuts is mashed into a paste and eaten. Many of the atolls in the Pacific produce no other food except the omnipresent cocoa-nut. The taste is rather insipid, and the odor disagreeable. The flower is fleshy and fragrant, and the native doctors in India use it as a sort of love-potion. It is certainly an emetic to some constitutions. The aerial roots have their ends protected by a loose cap or thimble of cellular integument, which is at once absorbed where the root touches the ground. From the peculiar disposition of the leaves they shed water only from the tips and down the stem, forming a complete shelter from the rain, and supplying water where most needed.—*To be continued.*

THE GOLDSMITH BEETLE, AND ITS HABITS.

BY REV. SAMUEL LOCKWOOD.

AMONG the Beetles of North America, very few can bear away the palm for beauty from the *Cotalpa lanigera*, or, as popularly known, the Goldsmith Beetle. This insect holds no ignoble place in the Coleoptera, being a member of the family Rutilidæ, or the golden-gleaming ones. Indeed, Madam Cotalpa has long been an acknowledged belle among the Rutilians, themselves a distinguished family in Beetledom. No artist can vie with the gorgeous effect produced by the metallic tints of the Cotalpa's dress. Who has not seen the maiden sporting in a silken attire of but one color, which with every motion in the light became suddenly lustrous with beautiful hues. Almost a monochrome, yet the garb of the Goldsmith beetle presents a rich diversity of tints, chiefly of the yellow sorts. The wing-cases are a gleaming lemon, thus making the whole back appear as if encased by two large plates of paly gold, while the thorax and head are each covered with brilliant red gold, which in the light gives off an almost flaming hue. "The legs are brownish yellow, or brassy, shaded with green." The under part of the insect is a sheet of highly polished copper, from which stands forth a thick coat of "whitish wool," justifying its specific name *lanigera*, wool-bearer. It is pleasant to see how from such a seeming paucity of color, Nature has begotten in this insect such a richness of results. Although with a softer toning down, we see a not dissimilar success in that fine large Bombyx, the pale-green, satin-robed Moon-moth (*Attacus luna*), "preëminent above all our moths in queenly beauty."

In the month of May for many years, in the ordinary culture of my garden at Keyport, N. J., the spade has turned up the *Cotalpa lanigera* (Fig. 1, larva; Fig. 2, imago), and generally in company with the May-beetle, or Dor-bug (*Lachnosterna fusca*, Fig. 3, pupa). The beetle is figured in the NATURALIST, Vol. I, p. 222. Each season has furnished me many more Dors than Goldsmiths. And so far

Fig. 1.

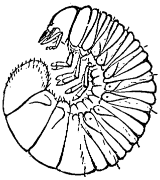


Fig. 2.

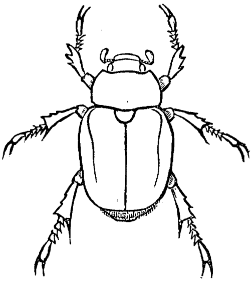
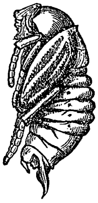


Fig. 3.



as my observations tend, the former are individually more mischievous.

To me the question of origin was interesting. Where did the Goldsmiths come from? It is a tree-beetle, and the spade turns them up in the ground. Do they originate in the trees or in the ground? Or is the latter the place for their winter sleep, and for the purpose of undergoing their transformations? On this point, I found the authorities all simply quoting Harris, who says, "the larvæ of this insect are not known; probably they live in the ground upon the roots of plants." My mind was made up to watch. If Newton could say in effect that to the astronomer patience is genius, the burden of the naturalist's "Life Psalm" is: "Learn to labor, and to wait."

For five years was kept up that vernal watching, every May yielding specimens, but no secrets. In the spring of 1865, to my surprise I turned up a fine, fresh, pale imago out of a small heap of dirt that I had put there the previous autumn. This gave a new impulse to investigation. For, that the imago was not there when I made the mound, I was positive; nor could it have entered there during the winter. Hence it was beyond doubt that I had unwittingly carried the larva there myself; or, as I think more probable, the advanced pupa. That month a very strict watch was kept for all specimens that might be turned up by spade or plough, with the hope that a pupa, or a newly, but not quite developed imago, would be obtained. All was in vain. The next step was to examine very thoroughly every larva of a coleopterous kind found in proximity with the imagos. This led to the discovery that certain large whitish grubs about one inch and three quarters long, and over half an inch thick, had a yellowish brown scale on the part corresponding to the thorax, and it was thought it might ripen into the red golden hue of the thorax of the perfected insect. This decided my course. Like Scholasticus, who, having heard that the crow lived a hundred years, at once went to market, bought a young one, and resolved that he would see; I filled a deep glass jar with earth, and placed six large grubs on the top. It was interesting to observe how quickly these soft creatures burrowed out of sight. They seemed in distress and haste to get out of the light and heat.

Five months after,—it was late in October,—I removed a portion of the earth in the jar. Judge of my delight and astonishment to find a beautiful and perfect Goldsmith beetle in the earthen chamber, which had contained it in its pupa state. I now searched the jar carefully, and found two more seemingly perfect ones, and another ill-formed one. So my conjectures were right. Those white grubs were, indeed, the larvæ of the *Cotalpa lanigera.* Without farther disturbance, except to replace the earth, the jar was set away in the cellar for the winter.

Next May it was again examined. During the month two very pretty ones came to the surface of their own accord. I was delighted to find it was a pair, male and female. Farther examination showed that of the six larvæ, five became imagos, and one died in the pupa state. They were all Goldsmiths. Being particularly anxious about the pair, from which I had hoped to learn something respecting the time and mode of oviposition, extra attention was paid them, and young leaves of the different deciduous trees were supplied; but in vain. They lived but a few days, and died without furnishing one fact.

Now comes a curious question. These insects had lived in the perfect form from October until May, a little more than seven months, that is, the larger fraction of a year. Is this their habit? Do they thus spend, after the last metamorphosis, so much time in a subterranean life? Probably there are two reasons why I have never found the Goldsmith in the fall; the little need of working the ground then, and the probability that the spade or plough does not go deep enough; as in May, the insect is slowly travelling to the surface, and is met by the implement.

When collecting the larvæ in May, I often observed in the same places grubs of the Cotalpa of at least four distinct ages, each representing a year in the life of the insect, judging from Renny's figures of the larvæ of the English Cockchafer, or Dor-beetle (*Melolontha vulgaris*). But the English chafer becomes an imago in January or February, and comes forth into active life in May, just four years from the deposit of the egg. Supposing our Cotalpa to take on the imago form in autumn, and to spend its life from that time to the next May in the ground, it would be five years old when it makes its debut as an arboreal insect.

The books tell us that the larvæ of the Coleoptera always lie on their side. Why? Watching the movements of the Goldsmith in its chamber, I noticed that the cell, or cave, was made large enough to admit of considerable freedom of motion. Lying on its side, and in a curved posture, the larva secures for itself comfort, and the largest movement as respects allotted space; also by the curved motions thus made, the enlarging and keeping up the walls of its earth-chamber. The dog, in setting itself for repose, shows the old instinct,—first the whole body is put in a curve, next a circular motion is made, then it sinks upon its bed. This is the wolf making its bed. And this posture of repose most effectually defends the abdominal, the weaker parts of the body. It is so with the grub. Resting on its side, it in fact rests upon the ends of the hard dorsal segments, by the extension and contraction of which the cycloidal motion is attained, without any friction to the tender abdomen, while the friction of the back keeps the walls of the earth-chamber compact and smooth.

I laid a large larva on my study-table. It instantly turned on its round, smooth back, nicely balanced itself, and with feet upward, moved quite rapidly. One might call the movement serpentine. In fact, the motion was acquired by the separating and bringing together again of the hard segments, very much as the ventral bands or scales of the snake are moved by the ribs; the tenderness of the abdomen and feet accounting for this singular upside-down way of getting along. It certainly was an effectual getting over the difficulties of a new situation. But this experiment, tried with a younger larva, turned out otherwise. It travelled on its abdomen, and would not, even when so placed, go at all upon its back. It seemed to me that the dorsal segments were too soft to afford it the advantages thus had by the older individual.

I think the Goldsmith prefers land under present tillage, and that the dor-bug loves grassy land better than garden soils; hence the latter is to be regarded as the more injurious of the two. The Goldsmith beetle is very short-lived. It is likely that the female lays her eggs in the ground in June, which month usually sees her for the last time. Their life I hardly think is given to much mischief. Says Harris, "pear trees are particularly subject to their attacks." A more recent observer, Mr. Uhler, indicates that its injury is not serious to this tree, and that it is more frequently found on other trees. It appears to me to be far from particular in its taste; for besides the trees mentioned by Dr. Harris, "the pear, hickory, poplar, and oak," I have found it on the Abele, or white poplar of Europe, the Bilsted, or sweet gum, and seen it eating the Lawton blackberry. For the double purpose of concealment from enemies and comfort of shade, it will draw together a couple of leaves, holding them by the sharp tiny hooks or grapnels on its feet. Of sluggish habits and but low instincts, it quietly nestles in its improvised arbor all the long summer day. At morn and evening twilight it ventures abroad, seeking its food, flying and buzzing about, enjoying its arboreal life, short at best, and to many very short indeed, as they fall an easy prey to the ever-watchful birds. Sometimes their little round of existence is abruptly broken in a very unsentimental way. The little Cotalpa, brimful of life, unintentionally enters the open window, and, dashing bewilderingly in a sort of involuntary blind-man's buff, strikes its tiny golden visor against the blinding lamp. Ah, thy doom is sealed! A feminine scream. Then the nervous mistress, napkin in hand, courageously attacks, and with the scissors triumphantly captures, and most satisfactorily destroys "the pesky thing!"

NOTE.—Fig. 3 represents the pupa of *Lachnosterna fusca*, the June bug, which was turned up by the spade in a garden in Maine, about the middle of May. The pupa of Cotalpa must closely resemble that of the June bug. It will be seen in our review of the Cosmos, that the cockchaffer lives three years instead of five as stated by early authors.—(EDS.)

THE OSPREY, OR FISH-HAWK.

BY AUGUSTUS FOWLER.

THIS well-known migratory hawk (*Pandion Carolinensis*) arrives on our coast about the last of April, and departs for the south in the month of October. It subsists entirely upon fish, which it procures by its own industry, laboring from morning till evening twilight. Upon examining this bird it will be seen by its peculiar organization how well it is adapted for its vocation. The body is compact and strong, wings long, pointed, and extremely powerful; the femur and tibia muscular; the soles of the feet supplied with hard scaly protuberances, which, with its long, sharp, round claws, prevent its prey from slipping from its grasp when once fairly struck. In the Osprey the wings denote great power; they are acute and long, and, as the wing is the lever of the power, the more distant its extremity is from the centre of motion the more power it has in resisting the air. The stiff, elastic quill-feathers arising from the wing of the osprey, called the primaries, are sixteen inches in length including the quills; the quills are three and a half inches long, and seven-eighths